



# **Armed Forces College of Medicine AFCM**

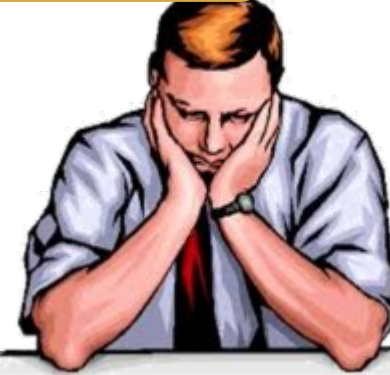


# **DEVELOPMENT OF GIT 1**

## **[Development of Esophagus, Stomach & Spleen]**

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## **INTENDED LEARNING OBJECTIVES (ILO)**



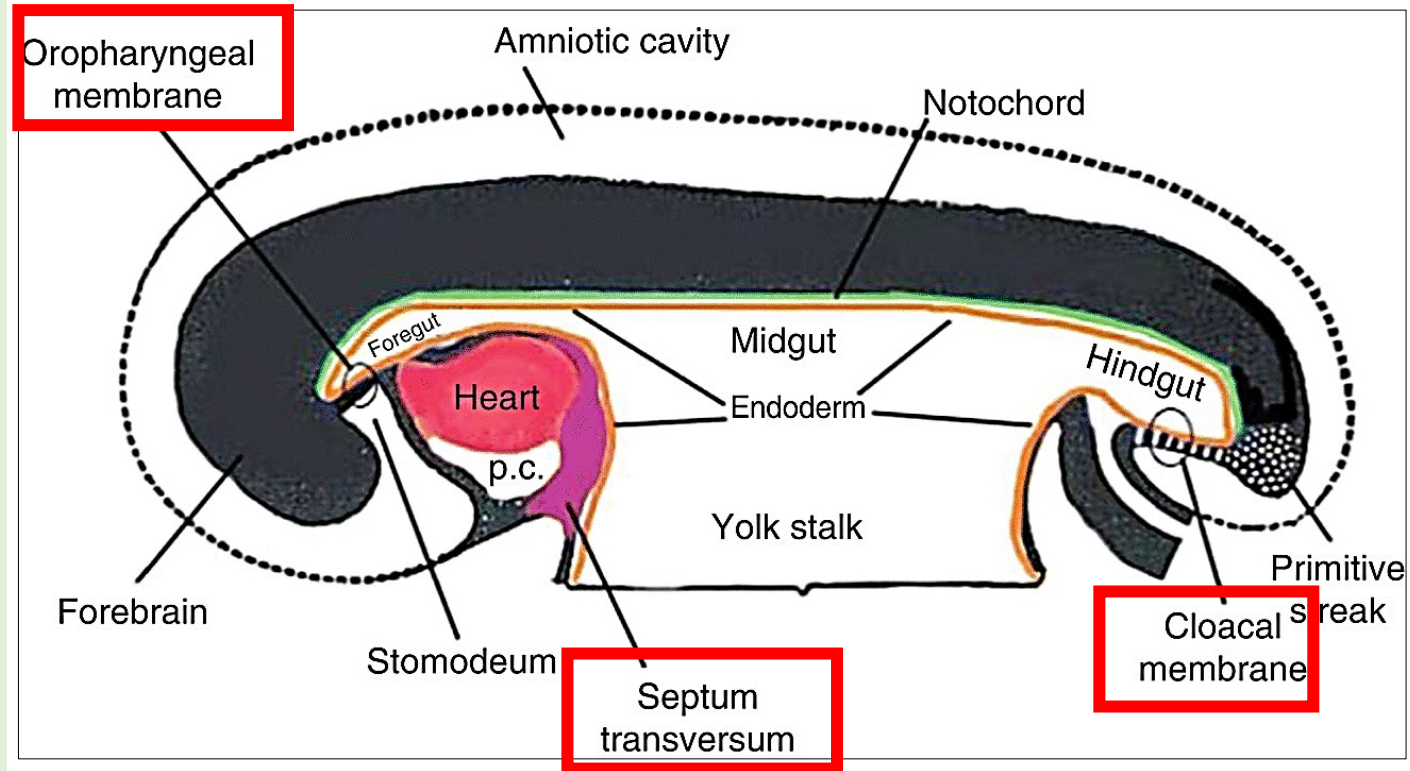
**-At the end of this lecture, students should be able to:**

- i. Define early stages of development of the gut tube.**
- ii. List the sources and steps of the development of esophagus, stomach & spleen.**
- iii. Describe the development of the peritoneal folds of stomach & spleen.**
- iv. Explain the congenital anomalies of esophagus, stomach & spleen.**

# Early development of the gut tube:

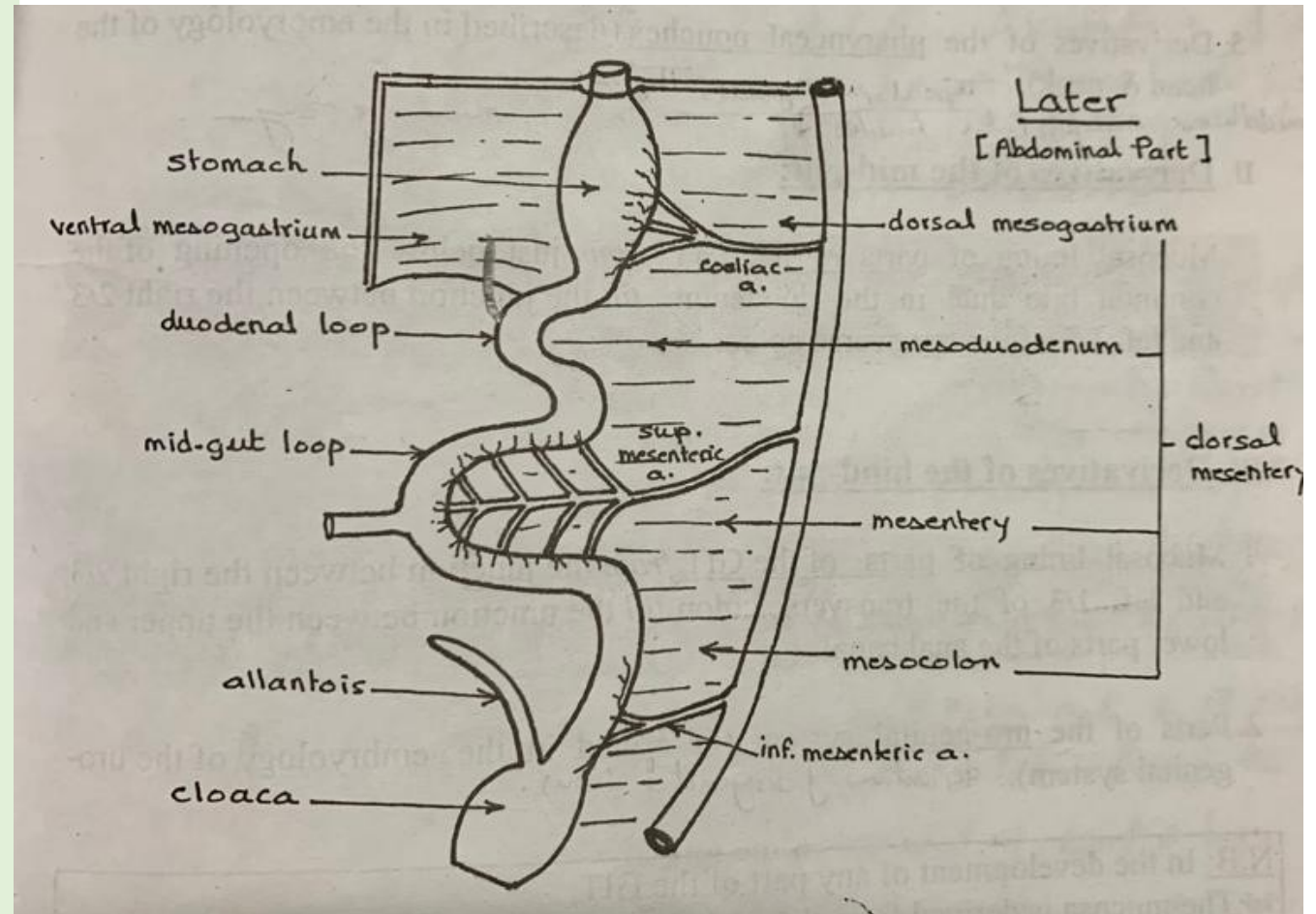
□ As a result of folding, the endoderm is enclosed inside the embryo forming the gut tube. The gut is formed of three parts:

1. **Fore-gut:** inside the head fold. Its cranial end is closed by the **bucco-pharyngeal membrane**.
2. **Hind-gut:** inside the tail fold. Its caudal end is closed by the **cloacal membrane**.
3. **Mid-gut:** in between. connected to the **vitello-intestinal duct**.



As a result of elongation of the gut, the following features appear in a cranio-caudal order:

1. Fusiform stomach.
2. Duodenal loop.
3. Mid-gut loop, connected to the vitello-intestinal duct.
4. Cloaca: is the dilated caudal most part of the hind-gut.

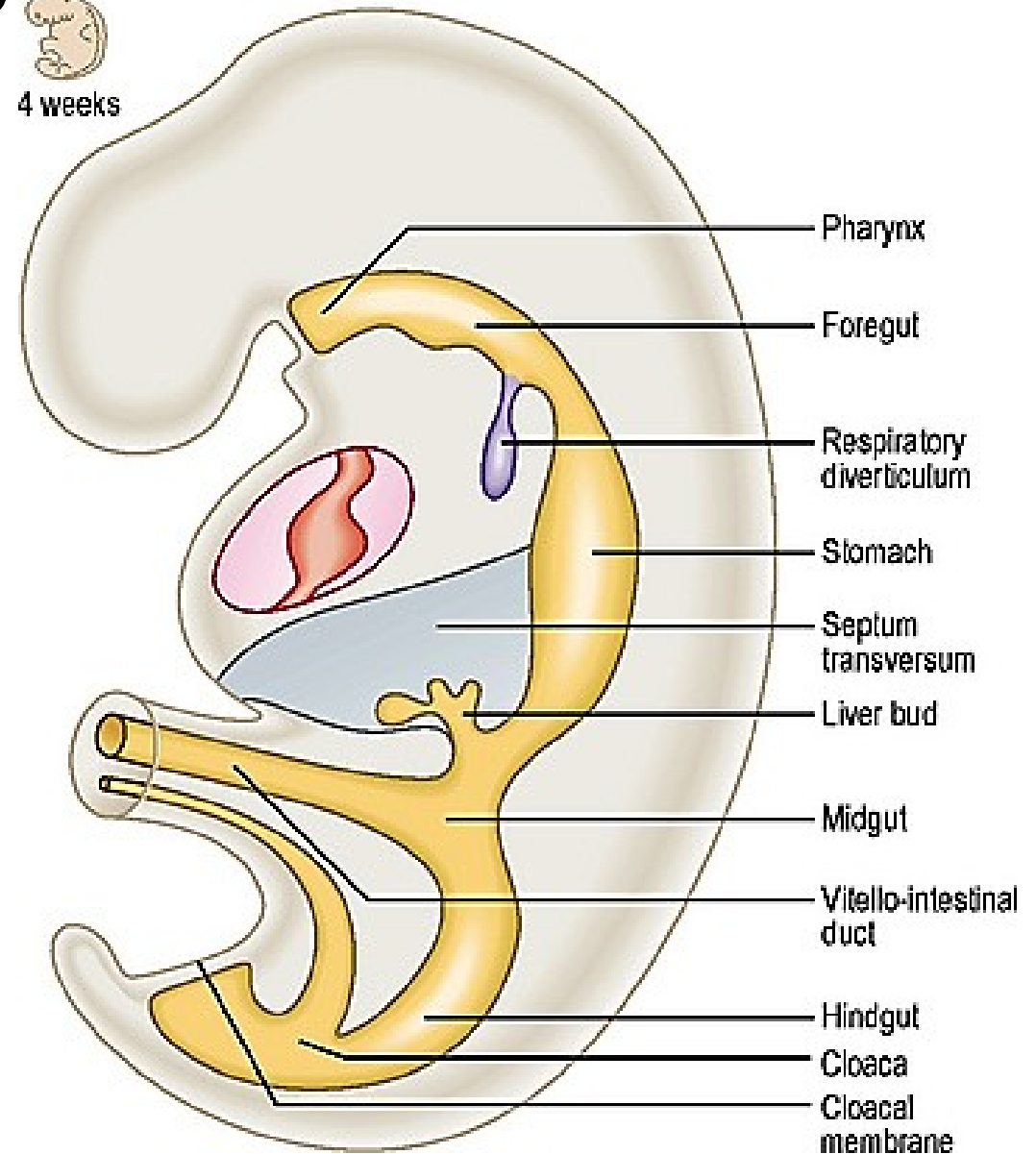


# I. Derivatives of the fore-gut:



4 weeks

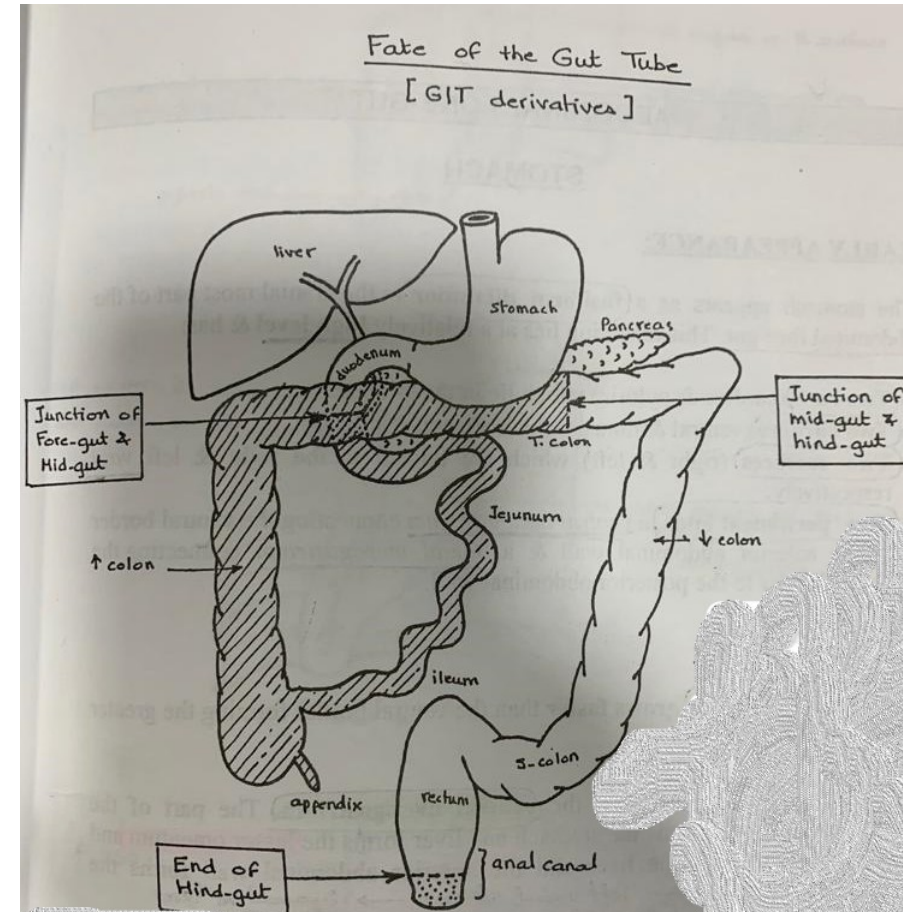
- 1. **Mucosal lining of parts of the G.I.T** from the posterior part of the mouth till the duodenum (at a level just distal to the opening of the common bile duct).
- 2. **Liver** parenchyma (hepatocytes) & the lining of the biliary passages.
- 3. **Pancreas** (parenchyma: acini, ducts & islets of Langerhans)
- 4. Mucosal lining of the **respiratory passages**.
- 5. Derivatives of the **pharyngeal pouches**.





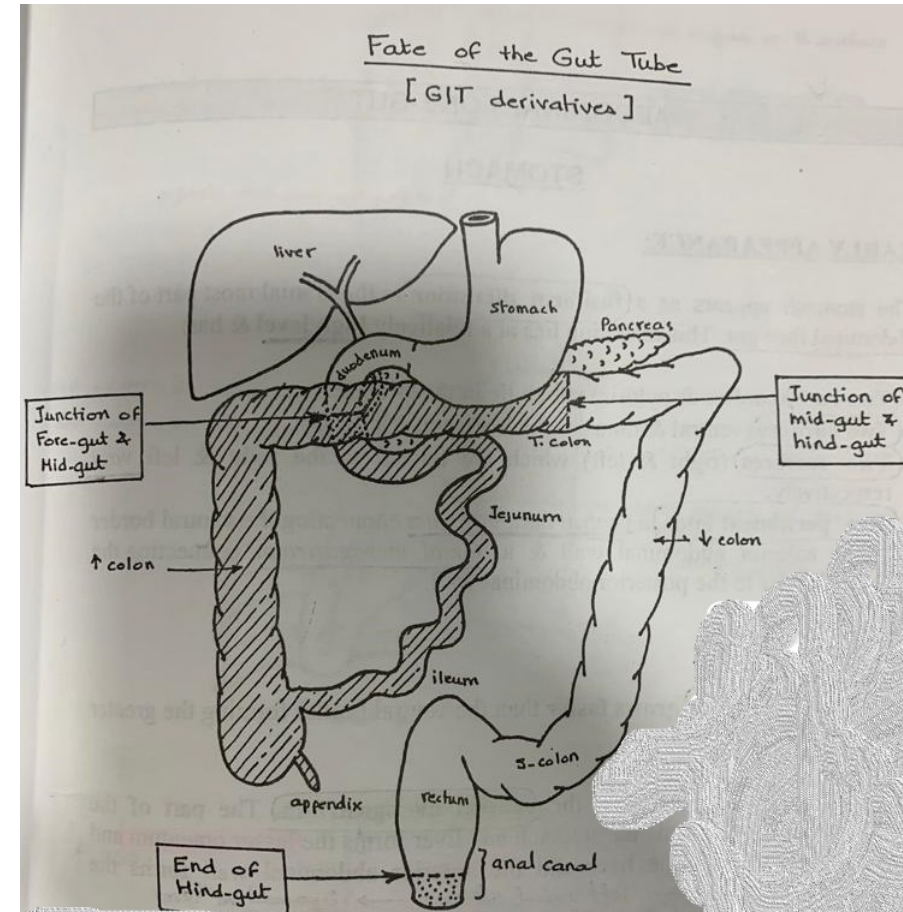
## II. Derivatives of the mid-gut:

- Mucosal lining of part of the G.I.T from just below the opening of the common bile duct in the duodenum till the junction between the right 2/3 and left 1/3 of the transverse colon.



### III. Derivatives of the hind gut:

- **1. Mucosal lining of part of the G.I.T from the junction between the right 2/3 and left 1/3 of the transverse colon till the junction between the upper and lower parts of the anal canal.**

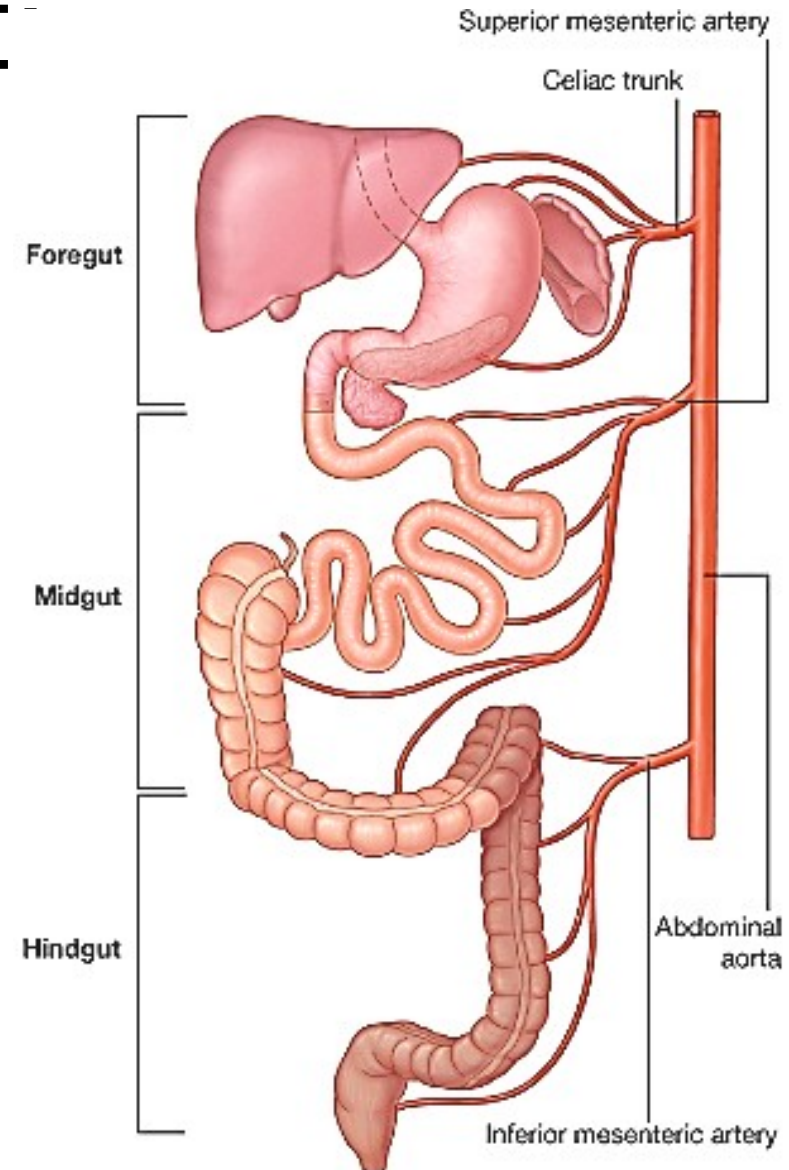


- **2. Parts of the uro-genital**



# Blood supply of the Gut

1. **Coeliac artery**: supplies the fore-gut.
2. **Superior mesenteric artery** : supplies the mid-gut.
3. **Inferior mesenteric artery**: supplies the hind-gut.



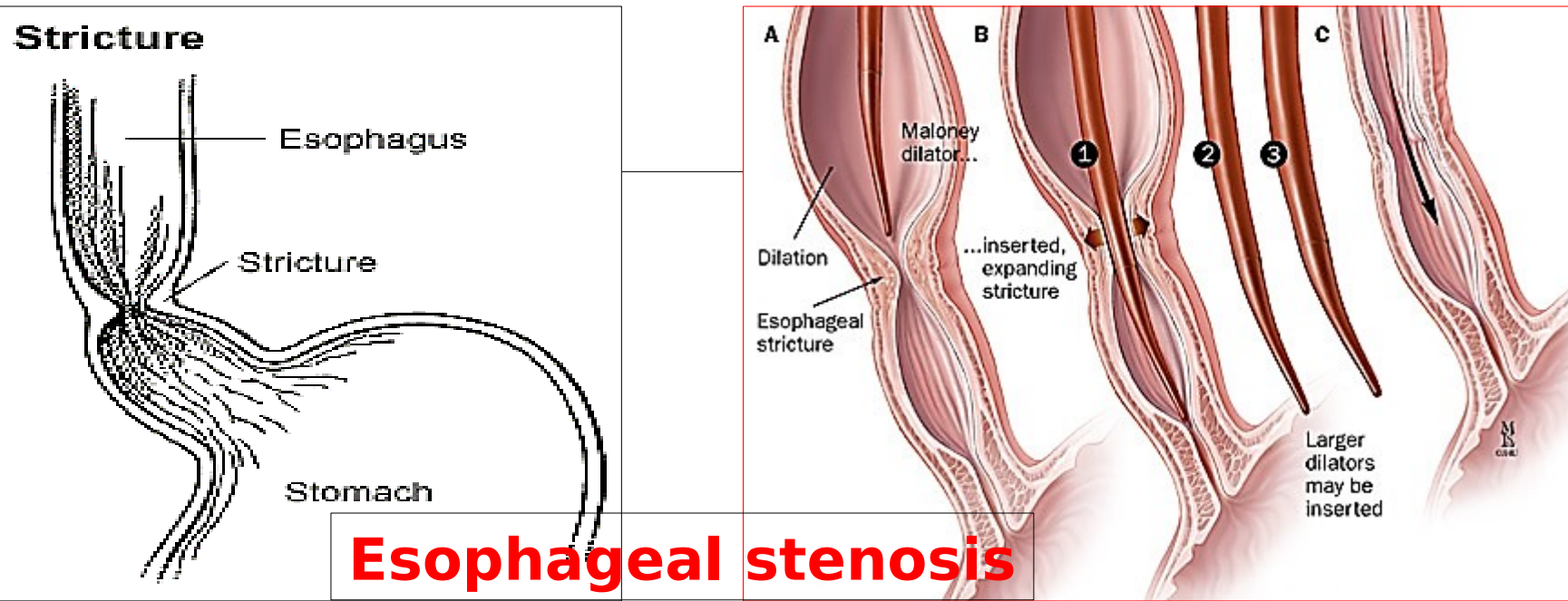
- Development of the esophagus:

- Esophagus develops from the foregut, caudal to the pharynx.
- .It separates from the laryngo-tracheal tube by the tracheo-esophageal septum.
- .Initially, the esophagus is short, but it elongates rapidly.
- The epithelium proliferates → obliteration of esophageal lumen followed by recanalization.

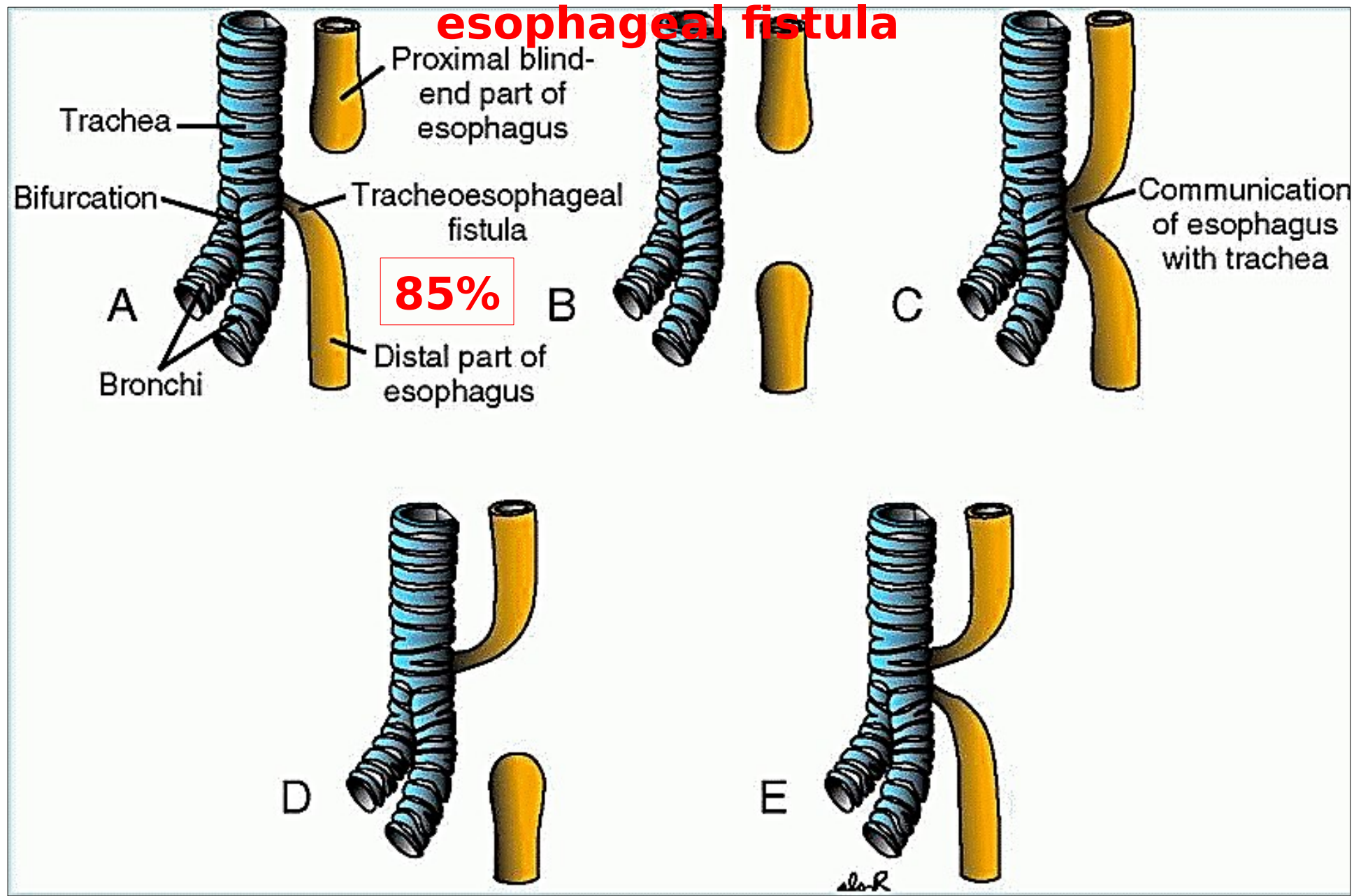


## ● **Anomalies of esophagus:**

- Esophageal **stenosis** (narrowing) & **atresia** (absence of the lumen).
- A fetus with esophageal atresia is unable to swallow amniotic fluid → **Polyhydramnios**.
- Esophageal atresia is frequently associated with **tracheo-esophageal fistula**.



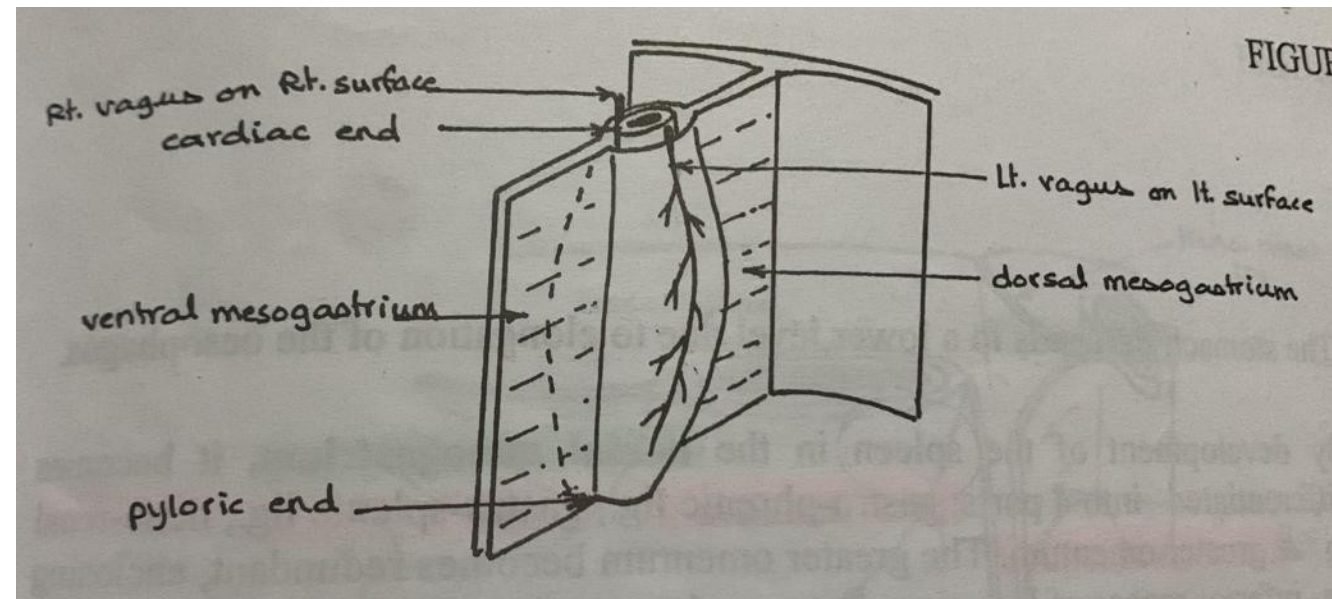
# Esophageal atresia & tracheo-esophageal fistula





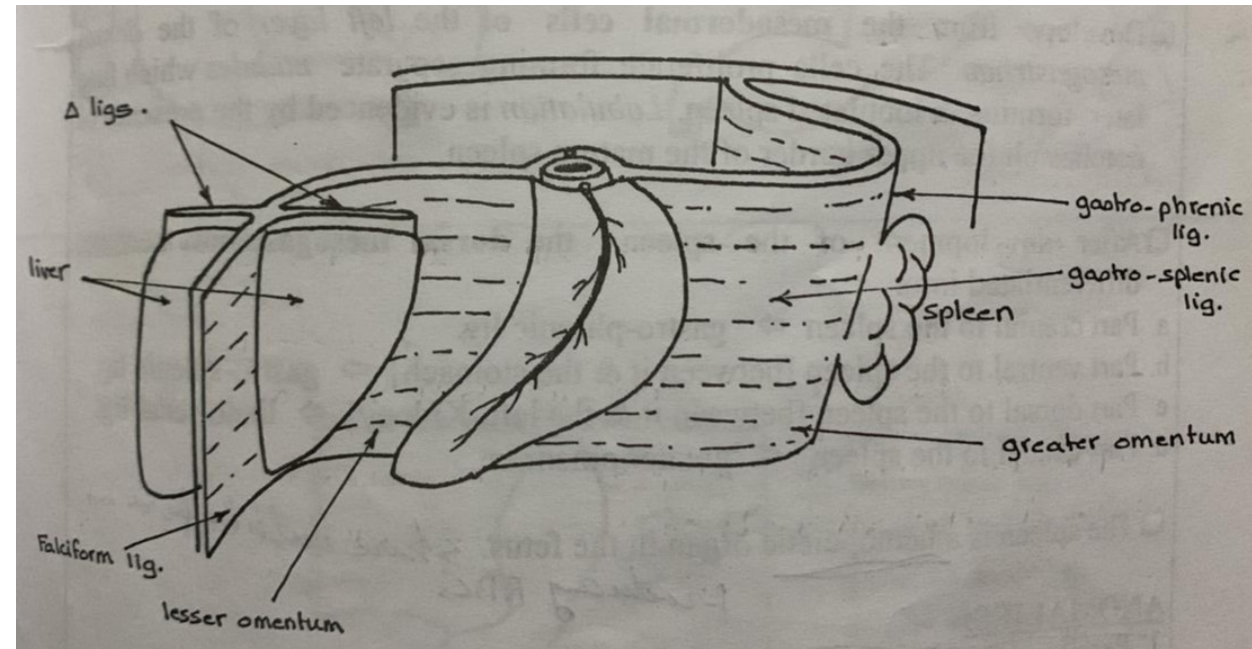
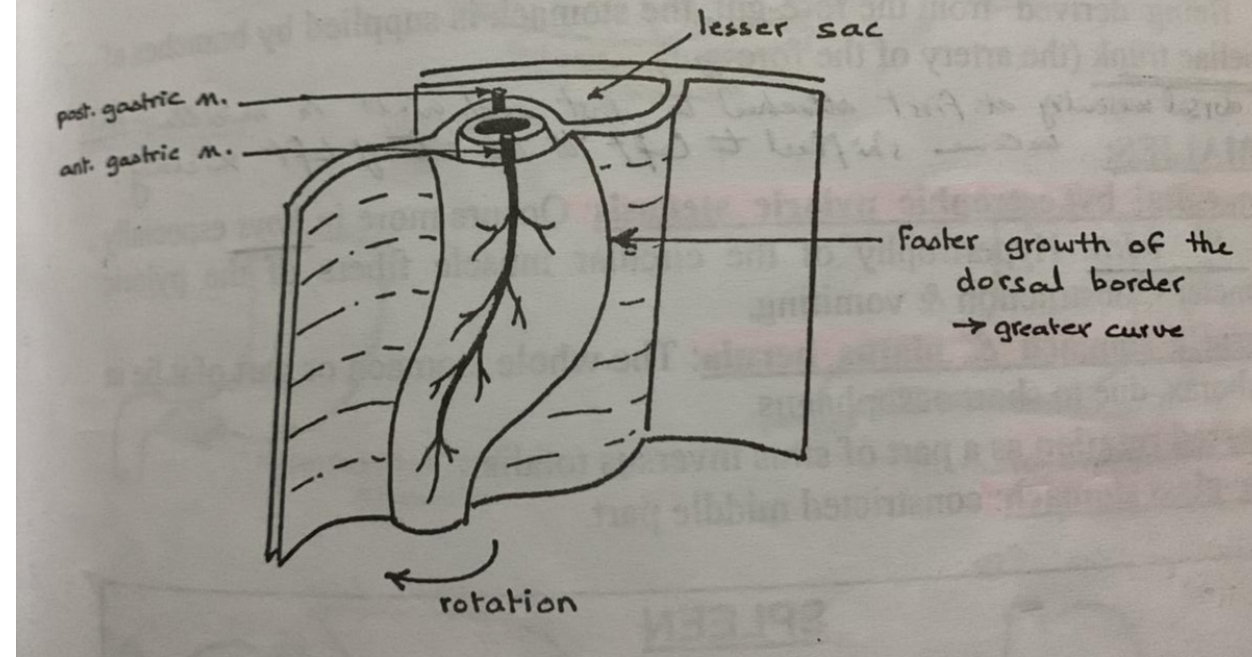
# stomach

- **Early appearance:**
- **The stomach appears as a fusiform dilatation in the cranial part of the abdominal fore-gut. This dilatation has:**
  - **Two ends (cardiac & pyloric) which lie in the midline.**
  - **Two borders (ventral & dorsal) which are equal in length.**
  - **Two surfaces (right & left) which are related to the right & left vagi respectively.**
  - **Two peritoneal folds, a ventral mesogastrium & a dorsal mesogastrium.**



- Later changes:

- The **dorsal border grows faster** than the ventral border forming the greater curvature.
- The **liver develops** within the ventral mesogastrium. The part of the mesogastrium between the stomach and liver forms the lesser omentum and the part between the liver and the anterior abdominal wall forms the falciform ligament.
- The stomach **rotates** 90° to the right around its longitudinal axis. □ The right surface becomes posterior & the left becomes anterior. □ The right vagus becomes the posterior gastric nerve & the left vagus becomes the anterior gastric nerve.

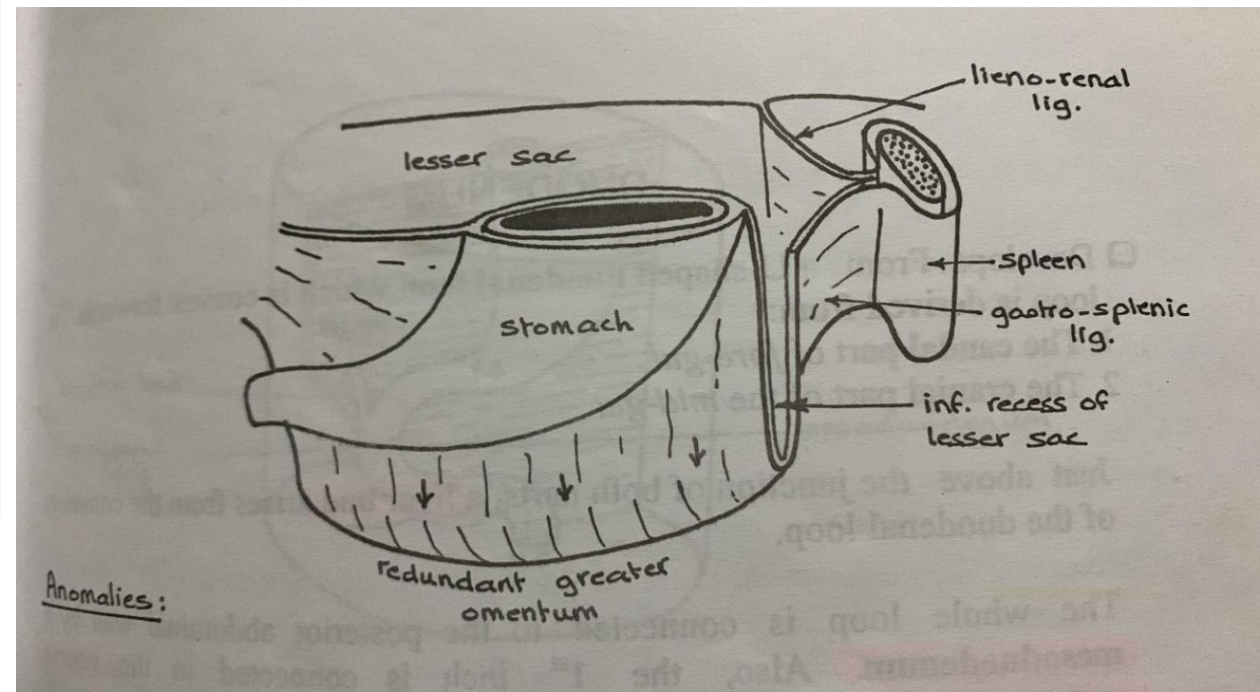
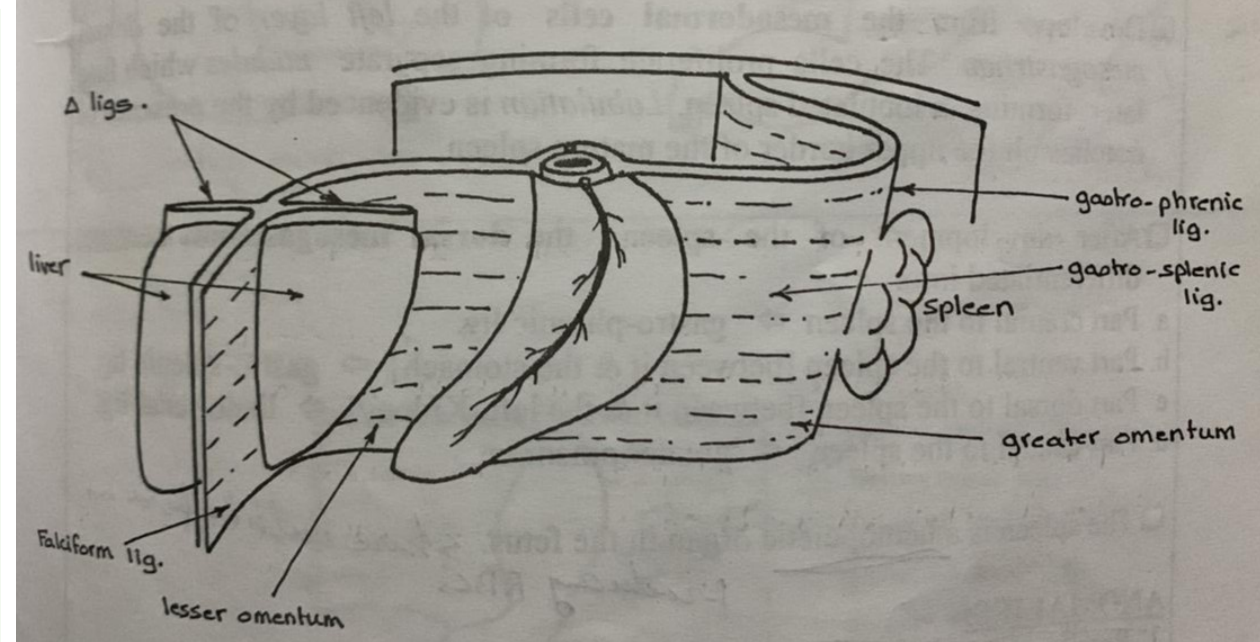




- The lesser curvature faces right & the greater curvature faces left.
- The dorsal mesogastrium becomes **elongated** towards the left, thus a peritoneal recess, the **lesser sac**, is formed behind the stomach.
- By development of the **spleen** in the dorsal mesogastrium, it becomes differentiated into 4 parts: gastro-phrenic lig., gastro-splenic lig., lieno-renal lig. & greater omentum.
- The greater omentum becomes

redundant.

■ **Being derived from the foregut, stomach is supplied by branches of the coeliac trunk** (the artery of



Anomalies:

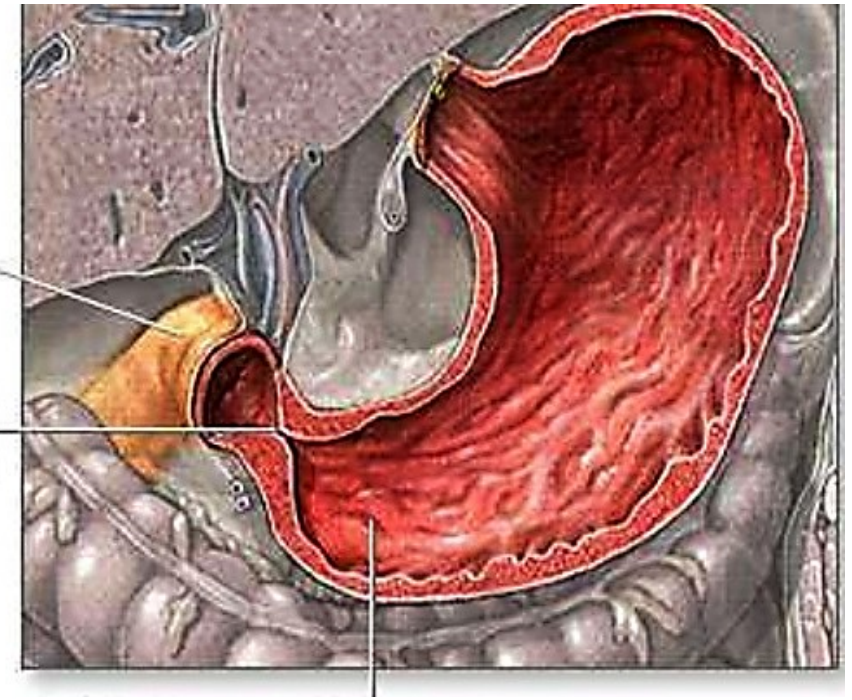
# Anomali

## 1. Congenital hypertrophic pyloric stenosis: **es**

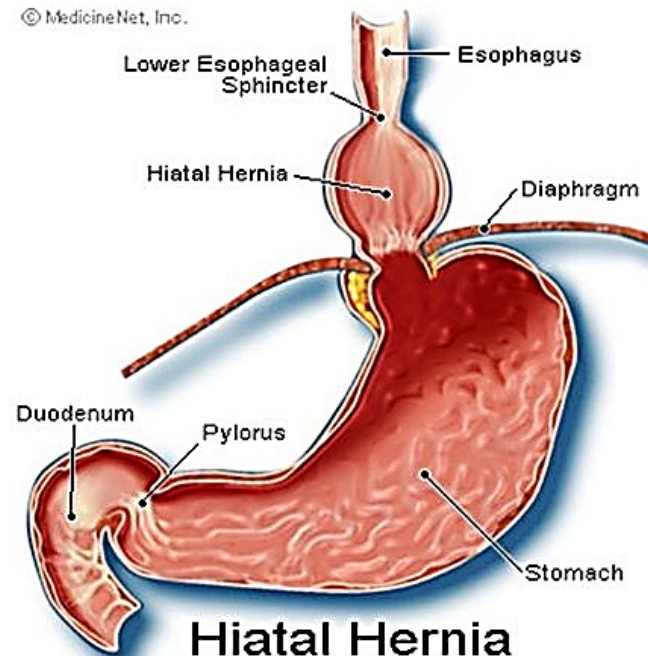
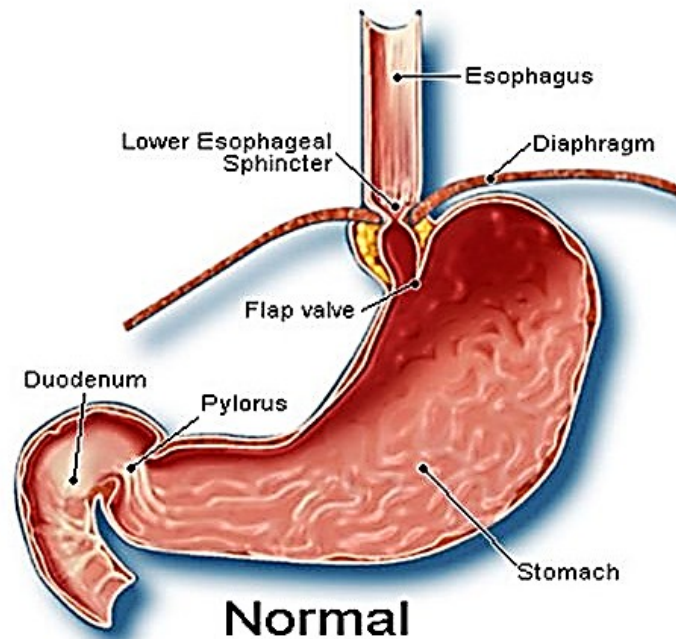
Occurs more in boys especially the first born. Hypertrophy of the circular muscle fibers of the pyloric sphincter  
□ obstruction & vomiting.

Duodenum

Pyloric stenosis

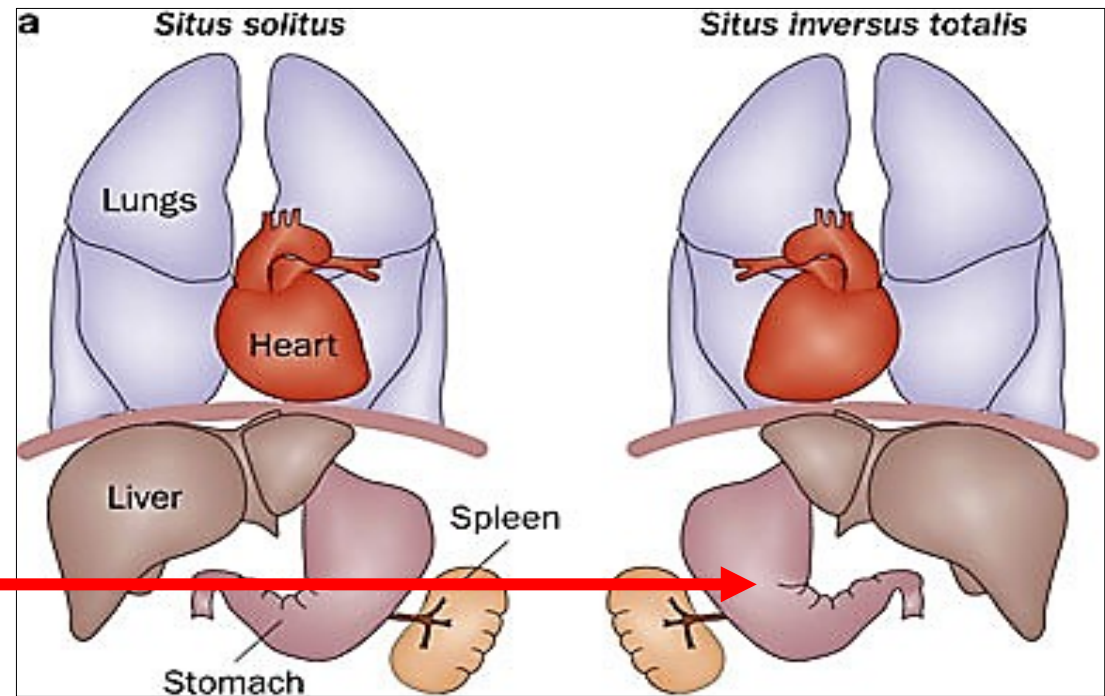


**2. Thoracic stomach & hiatus hernia:** The whole stomach or part of it lies in the thorax, due to short oesophagus.

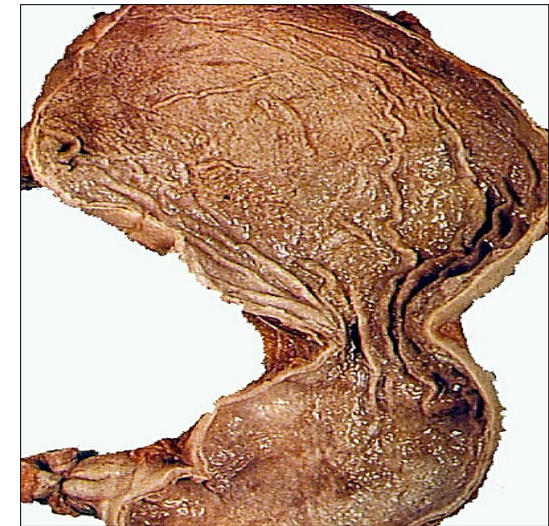
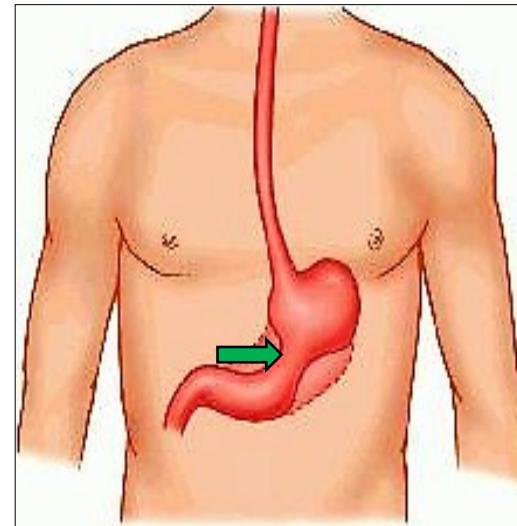




**3. Reversed rotation** as a part of situs inversus totalis.

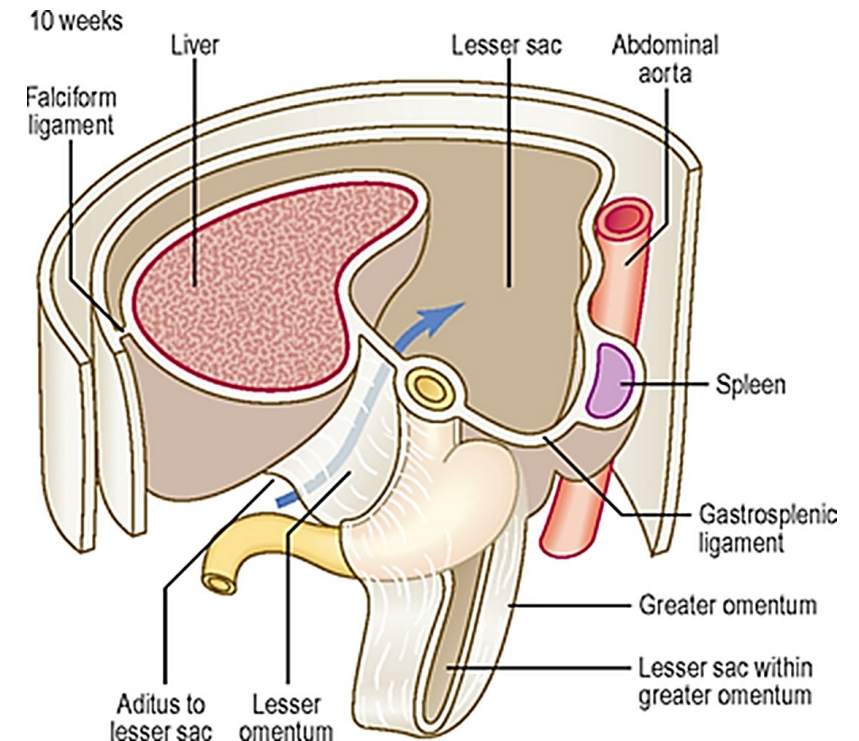
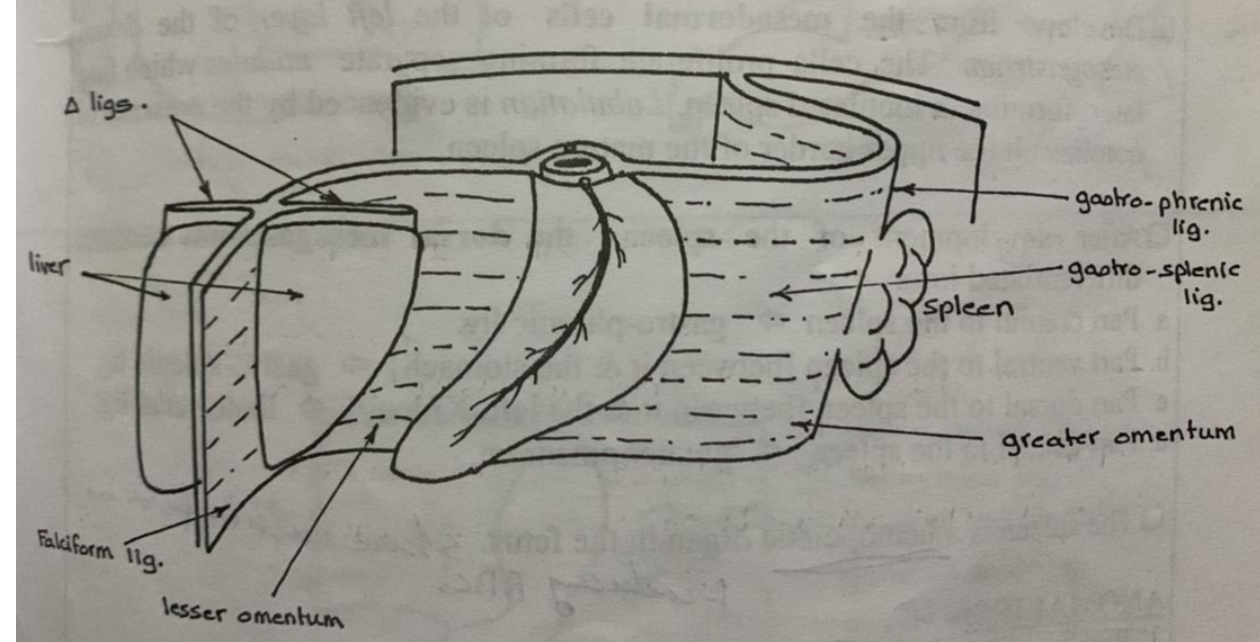


**4. Hour-glass stomach:**  
constricted middle part.



# SPLEEN

- Develops from the mesodermal cells of the left layer of the dorsal mesogastrium.
- The cells proliferate forming separate nodules which fuse later forming a lobulated spleen.
- Lobulation is evidenced by the presence of notches on the upper border of the mature spleen.
- The spleen is a hemopoietic organ in the fetus.



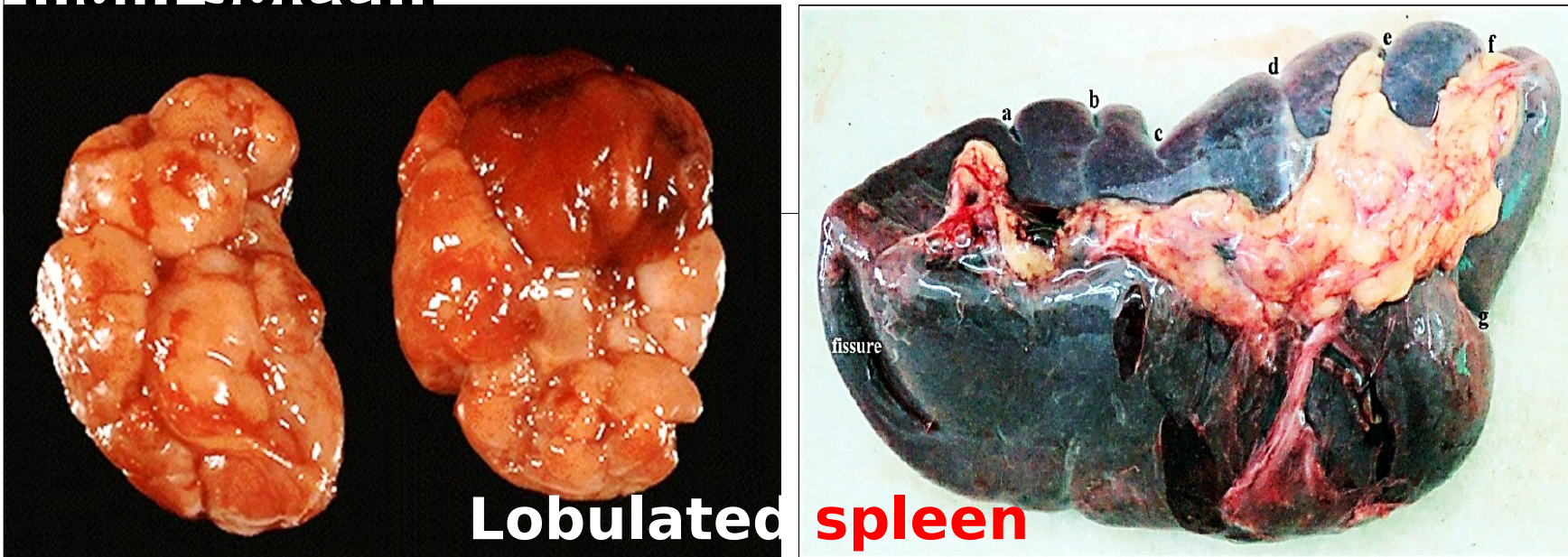


-Spleen is supplied by splenic artery which is a branch of coeliac trunk (artery of the foregut).

■ **Anomalies of the spleen:**

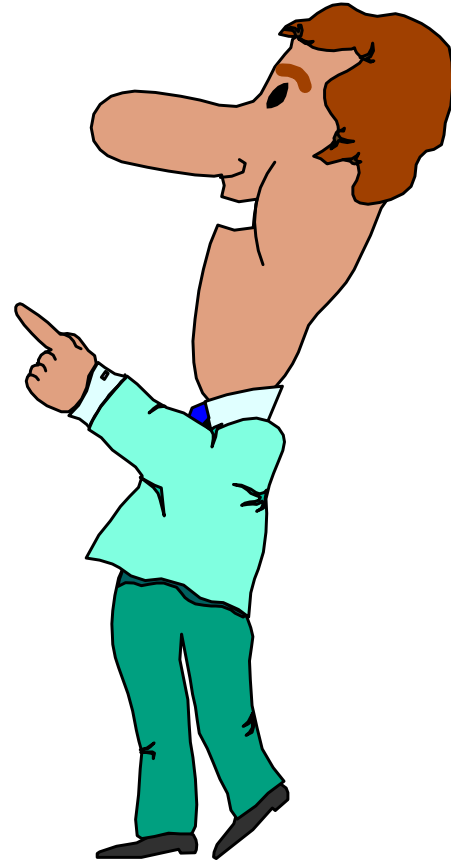
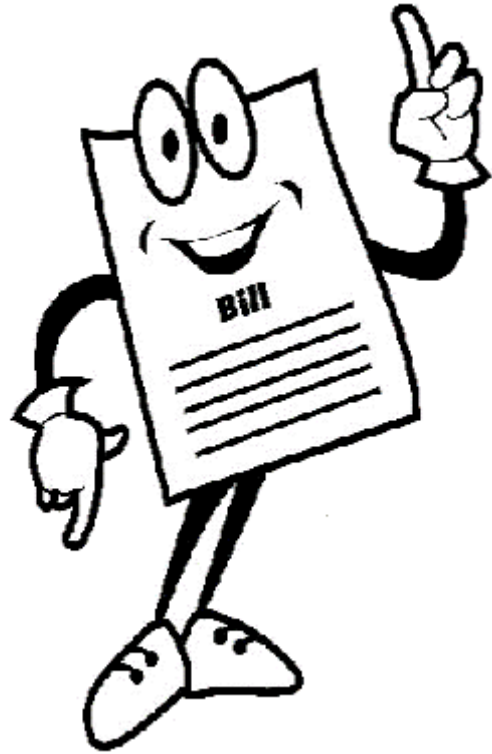
1. Persistent fetal lobulation: Due to incomplete fusion of fetal splenic nodules.

2. Accessory splenic nodules: Due to failure of fusion of one or more splenic nodules with the main spleen.





# QUIZ



a. Foregut is connected to the definitive yolk sac by the vitello-intestinal duct.

b. It gives the parenchyma of the liver & pancreas.

c. It is connected to midgut by anterior intestinal portal.

d. Stomach rotates  $90^\circ$  to the right in anti-clockwise direction.

e. Spleen develops from the endoderm of foregut.

***F - T - T - F - F***

One of the following ligaments or omenta is not a part of dorsal mesogastrium:

a. Lesser omentum.

b. Gastro-splenic ligament.

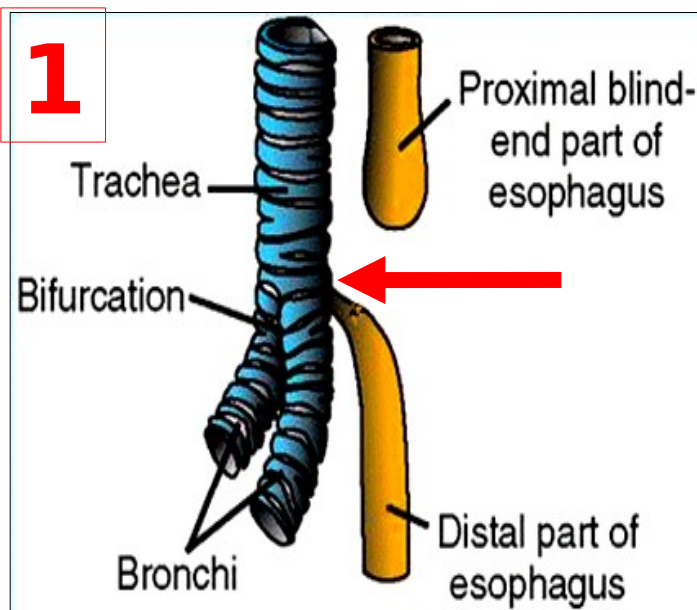
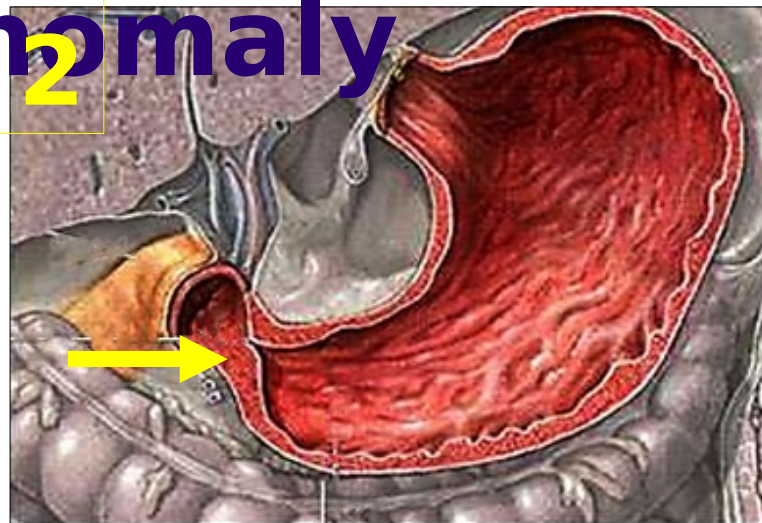
c. Greater omentum.

d. Leno-renal ligament

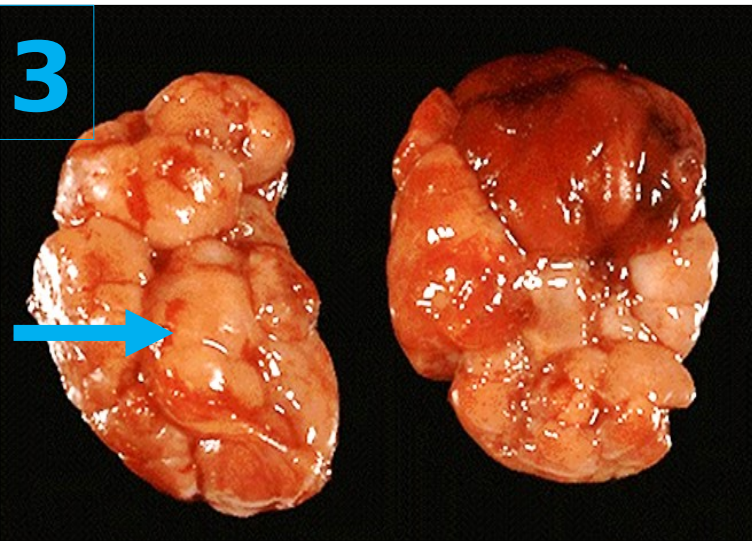


# Identify the anomaly

2



3



## References

1. Keith L. Moore: Before we are born, essentials of embryology and birth defects; 7<sup>th</sup> edition.
2. Langman: Medical embryology; 11<sup>th</sup> edition.
3. Web site:  
[www.studentconsult.com](http://www.studentconsult.com)

**GOOD LUCK**